

# Weekly Reader<sup>®</sup>

SENIOR EDITION

1 OF 2 SECTIONS

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A soldier wears a high-tech helmet now being developed. The eyepiece will eventually display computer-created maps that will help the soldier determine his location and the location of the enemy.

**THE NEW SOLDIER**

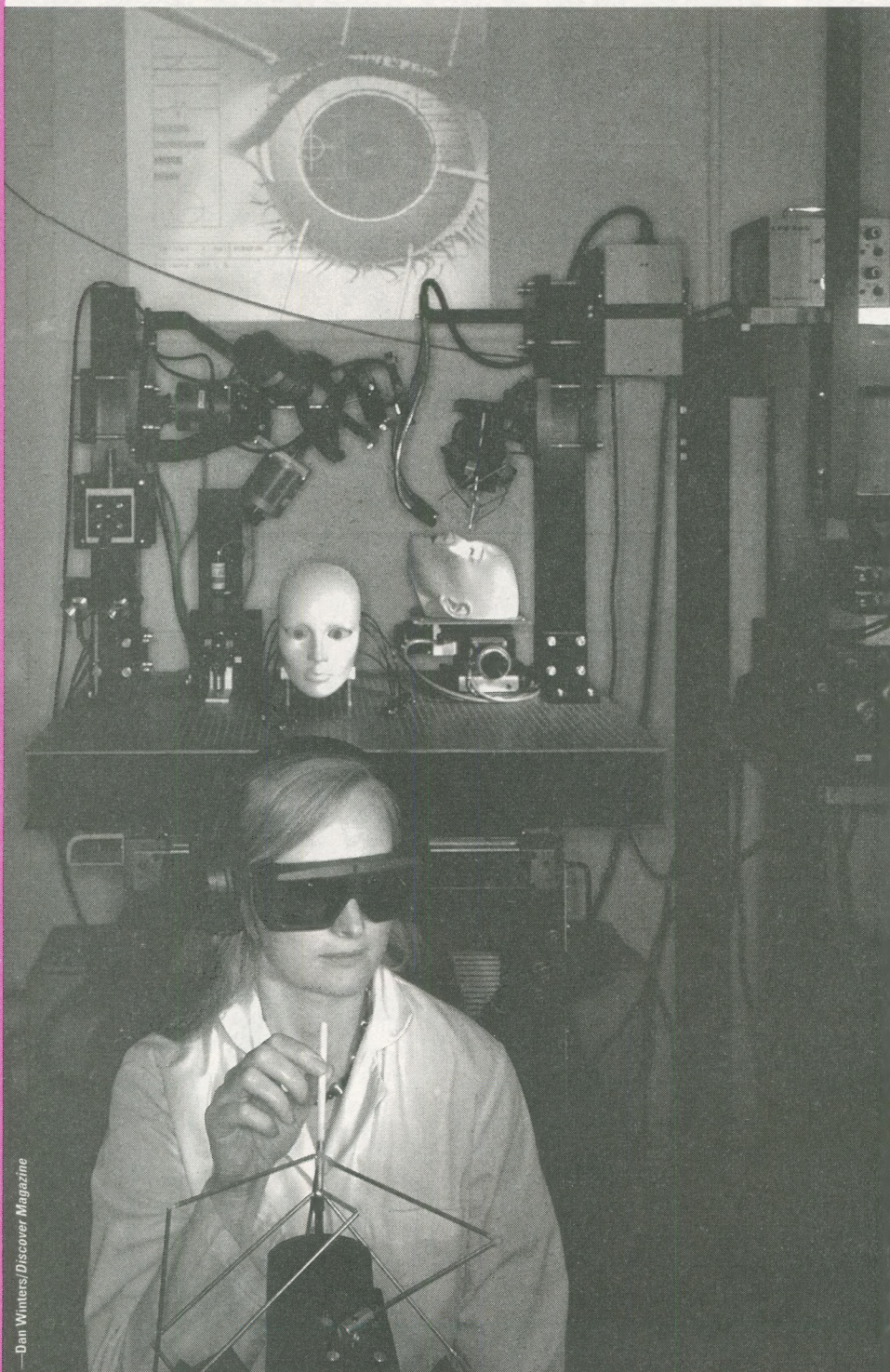
## High-Tech Training May Save Lives

*See page 4.*





# Doctors Make High-Tech House



Question: How many miles would a doctor in New York City travel to operate on patients in rural Mexico, war-torn Bosnia, or downtown Tokyo?

Answer: Zero.

Sound impossible? It is—for now. But doctors may soon be able to use *virtual-reality* technology to treat faraway patients. *Virtual reality* allows users to interact with three-dimensional images on a screen.

The new virtual surgery, called *telesurgery*, could allow surgeons to perform life-saving techniques on soldiers wounded on remote battlefields or on ill children who live far away from high-tech hospitals.

## Long-Distance Surgery

During most operations, a team of nurses and doctors works on a patient in an operating room. In the future, the only flesh-and-blood human in the room may be the patient.

A patient will lie on a table next to a remote-control robot and high-tech video equipment. Hundreds or even thousands of miles away, a surgeon will sit at a virtual-reality control center.

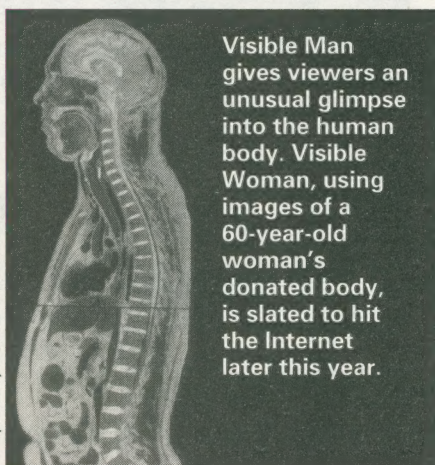
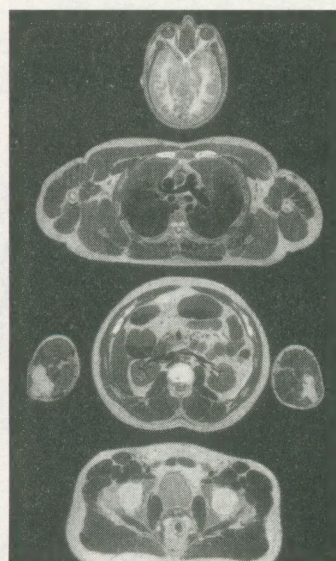
The surgeon will wear a headset that shows camera images of the patient, sent via satellite by the robot. The surgeon will slip

**In a Massachusetts laboratory, researcher Lynette Jones manipulates a scalpel around a mannequin's eye. Jones watches her movements on a virtual-reality headset.**



# Calls

## Doctors Train On Computer Patient



Visible Man gives viewers an unusual glimpse into the human body. Visible Woman, using images of a 60-year-old woman's donated body, is slated to hit the Internet later this year.

—All photos by AP/Wide World Photos

Imagine being able to travel throughout a human body. You could look inside arteries, see the stomach break down foods, or even explore the twists and turns of the brain's gray matter.

A new three-dimensional, computer-generated map of the body allows people to do just that. The map was created from thousands of digitized pictures of the insides of a 39-year-old Texas man who died and left his body to science. Experts say the map could help surgeons better prepare for operations.

Researchers at the University of Colorado Health Sciences Center placed the man's body in gelatin and froze it. Then they cut the frozen corpse into 1,800 microthin slices and photographed each slice.

The photo series, called Visible Man, was then put on an international computer network called the Internet. Viewers can call up Visible Man photos from the Internet and look at the body one slice at a time.

Visible Man project coordinator Michael Ackerman says doctors could use Visible Man to practice surgical techniques. They could also use it to learn how to treat cancer patients better. Using advanced computer programs, doctors could practice treating cancer on Visible Man before attempting to treat the same kind of cancer on real patients.

Internet users who have questions about Visible Man can contact coordinator Ackerman via E-mail at [ackerman@hpcc.gov](mailto:ackerman@hpcc.gov).

A satellite will pick up the movements of the surgeon's gloves and transmit them to the robot. The robot will then mimic the movements and perform the surgery. The robot's movements will be even more precise than the surgeon's, making the surgery more accurate and less dangerous.

### Surgeons Around the World

Experts say telesurgery will help all kinds of patients around the world. "Simply by setting up a virtual-reality link," says British surgeon Duncan Bell, "a hospital in the third world will possess a specialist in medicine. Bodily, he's not there. But virtually, he is."

Ian Hunter, an engineer at the Massachusetts Institute of Technology, says telesurgery could become so advanced that robotic surgeons may one day scour battlefields in search of soldiers who need virtual medical attention.

Hunter admits that the roving robosurgeon is a vision of the future. But, he says, "it's not a fantasy."

**CRITICAL THINKING** What types of problems might a surgeon encounter while performing tele-surgery? How might those problems be prevented?



## THE NEW SOLDIER

# High-Tech Training May Save Lives

Private William Plaag and his platoon were given a mission: help other platoons rescue a U.S. ambassador and 30 hostages from an enemy prison camp.

When the platoons attacked the camp, heavy fire broke out. Plaag's platoon got hit hard. He radioed his commander, "Sir, I just got creamed! I had no ammo for my mortars."

If Plaag had been involved in a real battle—which he wasn't—he and other members of the platoon would be dead right now. Instead, Plaag was involved in a massive *virtual-reality* battle, played out recently among 7,500 U.S., French, Dutch, British, and German soldiers sitting at computer terminals.

*Virtual reality*, or VR, is a highly advanced computer system that allows a user to interact with three-dimensional images on a screen. VR battles are among a host of high-tech advances that experts say will one day change the way U.S. troops fight battles.

## Practice Makes Perfect

The U.S. Army is using VR battles to help soldiers safely practice techniques used in actual combat. In the recent VR battle, troops located in several nations fought the same lifelike enemies on their computer screens. The battle took place on a 2,384-square-mile

computer-created battlefield exactly like an actual military training area near Munich, Germany.

Says VR expert Lt. Col. Pete Marion, "We have given [the soldier] all the sights, sounds, and stimuli that are out there on the actual battlefield."

Practicing battle maneuvers before an actual battle, says Marion, helps prepare soldiers for combat and also helps reduce the number of soldiers killed or injured in the fighting.

## The Future Soldier

Here are examples of other high-tech devices now being developed to help save lives and make soldiers more effective warriors.

- **Instant identification.** During previous wars, some U.S. troops lost their lives when other U.S. troops mistook them for the enemy. Computer systems now being developed could help greatly reduce the number of troops killed by so-called friendly fire.

The systems use satellites to track the locations of U.S. tanks and other vehicles. Computers in planes and tanks will use information from the satellites to determine whether an unidentified vehicle is friendly or belongs to the enemy. Experts say proper identification could save U.S. lives.

- **Medical monitors.** A computer built into a soldier's uniform will one day contain special sensors to measure temperature, heart rate, blood pressure, and other vital signs. In the event the soldier is wounded, the computer will relay information about the soldier's condition to a field hospital. Doctors there could then program the computer to inject the soldier with painkillers or other drugs.

- **Satellite locators.** Soldiers of tomorrow will use computers to find out their



A pilot works the controls of a flight simulator at the Army Research Institute. The pilot is learning how to refuel other aircraft in flight.







Army researchers monitor flight simulators at the Army Research Institute in Alexandria, Virginia. The simulators help train fighter pilots.

exact location. The computer, kept in a pack on the soldier's chest, will use satellite technology to determine the soldier's location within a foot. The computer will then flash a map of the area on a screen located in the helmet's visor. The map will not only show the soldier's location but also that of the enemy.

• **Ultrasensitive "hearing."** Soldiers will one day wear ultrasensitive "ears" on their helmets. The ears will amplify sounds from all directions and allow soldiers to detect conversations at a distance. "With these ears," explains Harvey Keene, an official for the U.S. Army Natick Research Center, "you can actually pick up an enemy conversation from a quarter-mile away."

Army Chief of Staff Gen. Gordon Sullivan says tomorrow's soldiers will enter an increasingly high-tech Army. The soldiers of the future, says Sullivan, "will probably feel like they've been transported aboard the *Enterprise* on *Star Trek*."

**CRITICAL**  
**?**  
**THINKING**

Is it possible that the soldier of the future could depend *too much* on computers? Why or why not?

—John B. Carnett/*Popular Science*



Digitized maps will help soldiers find their way around battlefields.

Electronic passwords will prevent enemies from listening to voice communications.

Special cooling system in backpack will keep soldiers cool for up to four hours.

Bulletproof vests made of Kevlar will protect soldiers from bullets and shrapnel.

Special monitors will detect mines and chemical-warfare agents.

Special camera will detect enemy troops at night and from great distances.

Private Brian Jackson demonstrates the latest in combat gear.



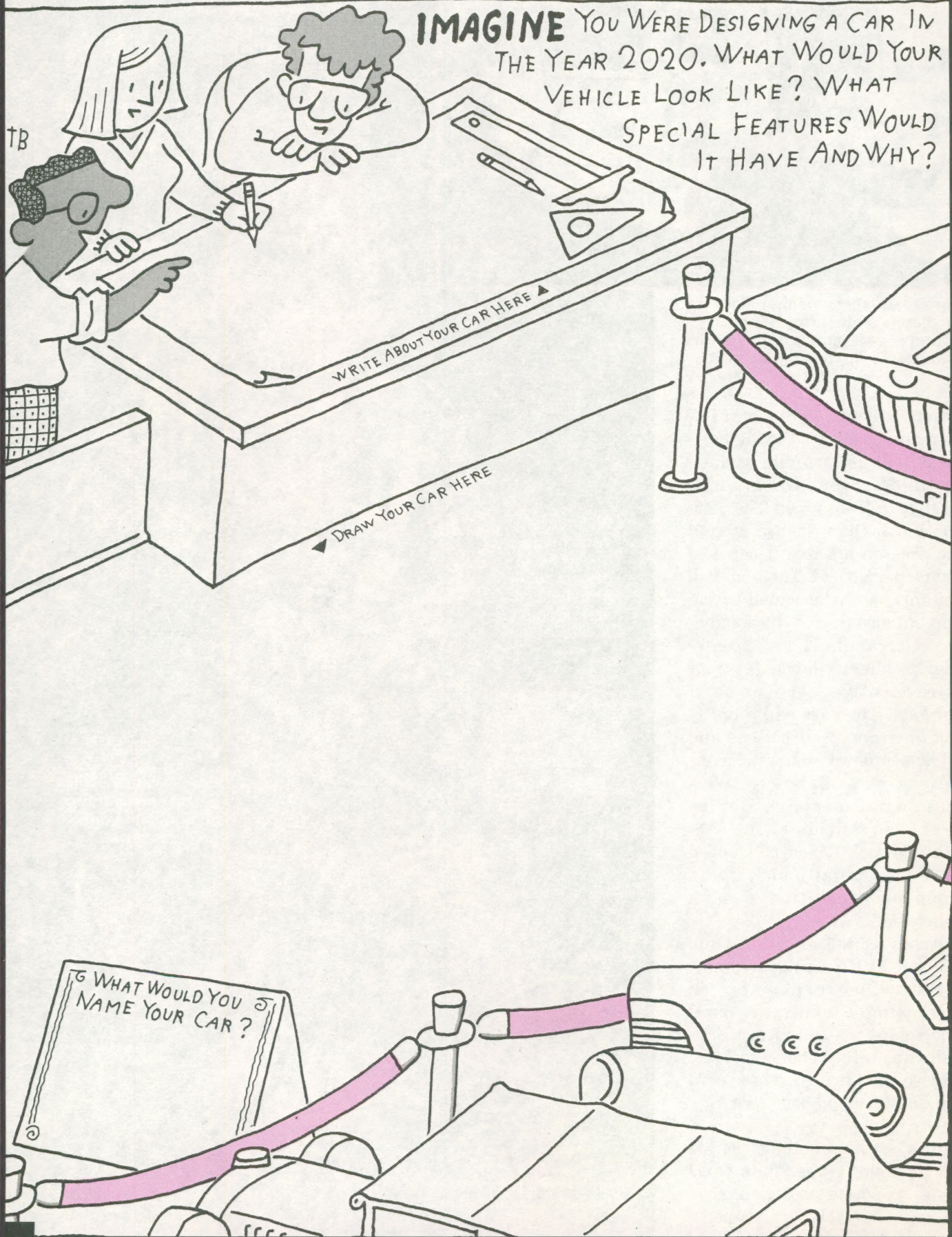
# MAKE BELIEFS

WRITE THEM © DRAW THEM © START THEM UP

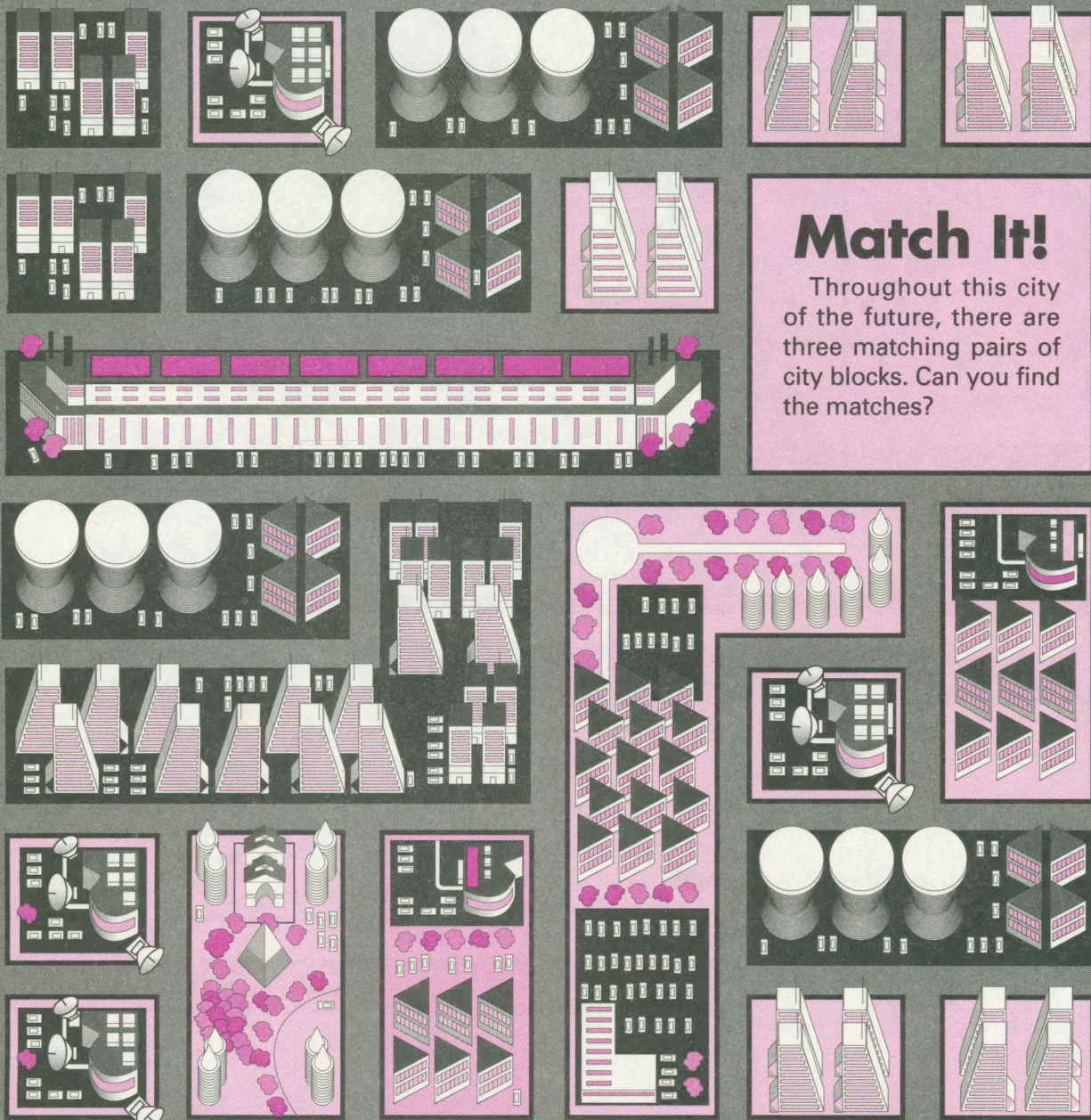


BILL ZIMMERMAN  
TOMBLOOM & YOU

**IMAGINE** YOU WERE DESIGNING A CAR IN  
THE YEAR 2020. WHAT WOULD YOUR  
VEHICLE LOOK LIKE? WHAT  
SPECIAL FEATURES WOULD  
IT HAVE AND WHY?





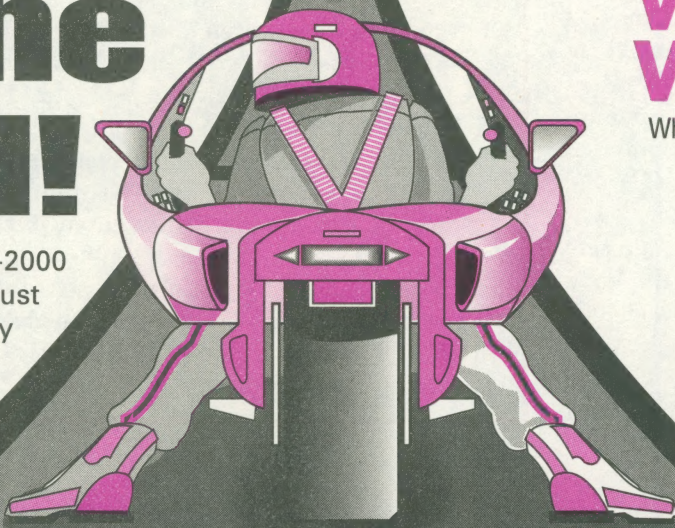


## Match It!

Throughout this city of the future, there are three matching pairs of city blocks. Can you find the matches?

# Hit the Road!

Help high-tech racer L-2000 finish the race. L-2000 must turn left or right at every intersection—every one. Can you find the only route the racer can take?



## Wacky Words

What word, saying, or phrase is represented in each arrangement of letters?

**THIS**

**BOARD TEAR TIER**

**EPI**



# Where Are the Largest Armies?



## GEOPLUS™ MATH ACTIVITY

Circle the letter of the response that best completes each statement.

- India has about as many troops as (A) France and Vietnam combined, (B) North Korea and South Korea combined, (C) Pakistan and Iran combined.
- Turkey has about half as many troops as (A) Russia, (B) North Korea, (C) the United States.
- Vietnam has about 270,000 fewer troops than (A) India, (B) Pakistan, (C) North Korea.
- Compared with the United States, China has about (A) 100,000 more troops, (B) 500,000 more troops, (C) 1 million more troops.
- Russia has about three times as many troops as (A) Pakistan, (B) Vietnam, (C) North Korea.
- France's military is about one-fourth as large as that of (A) China, (B) Russia, (C) the United States.
- A country with one-fifth as many troops as Iran has would have about (A) 10,000 troops, (B) 50,000 troops, (C) 100,000 troops.
- China, Russia, and the United States combined have about

(A) 4.5 million troops, (B) 7.5 million troops, (C) 11.5 million troops.



What factors might influence whether a country has a large or a small number of troops?



The fictional character Count Dracula made this region in the Carpathian (kar-PAY-thee-un) Mountains of Romania famous. Name the region.

## KNOW THE NEWS

Circle the letter of the response that best completes each statement.

Circle the letter of the response that best completes each statement.

- The U.S. Army is using virtual-reality battles to (A) find soldiers who are best suited to defend the country, (B) test advanced weaponry, (C) train soldiers for real-life combat.
- A computer built into a soldier's uniform will one day relay information about the soldier's vital signs to (A) the soldier's commander, (B) a field hospital, (C) the soldier's family.
- Satellites will be used in the army of the future to (A) track the locations of soldiers, (B) shoot down enemy aircraft, (C) record enemy radio conversations.
- In the operating room of the future, robots will perform operations by (A) following basic instructions already programmed into the robot's computer, (B) mimicking the movements of a surgeon at a virtual-reality center, (C) mimicking the actions of another robot working at a computer center.
- To create the Visible Man, researchers used (A) computer-created drawings of the human body, (B) photos of cross sections of an actual human corpse, (C) highly detailed photos of patients having surgery.